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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/866,595	05/30/2001	Jebu Jacob Rajan	1263.1751	4949

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FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER	
VO, HUYEN X	

ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 01/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/866,595	RAJAN, JEBU JACOB	
	Examiner	Art Unit	
	Huyen Vo	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40 and 43-58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40 and 43-58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 7, 9, 18-21, 27, 29, 38-40, 43, 48, and 54-58 are rejected under 35 U.S.C. 102(e) as being anticipated by Haimi-Cohen (US 6374221).

3. Regarding claims 1, 21, 43, and 57-58, Haimi-Cohen discloses an apparatus, method, a computer readable medium, and computer executable instructions, and for detecting the presence of speech within an input audio signal, comprising: a memory for storing a predetermined function which gives, for a given set of audio signal values, a probability density for parameters of a predetermined speech model which is assumed to have generated the set of audio signal values, the probability density defining, for a given set of model parameter values, the probability that the predetermined speech model has those parameter values, given that the speech model is assumed to have generated the set of audio signal values (*col. 7, line 32 to col. 8, line 20*); means for receiving a set of audio signal values representative of an input audio signal (*input of element 51 in figure 5*); means for applying the set of received audio signal values to said stored function to give the probability density for said model parameters for the set

of received audio signal values (*col. 7, line 32 to col. 8, line 20, the received signal is applied to a stored function to derive HMM, wherein each state of the HMM is represented by probabilistic distribution*); means for processing said function with said set of received audio signal values applied to obtain values of said parameters that are representative of said input audio signal (*col. 7, line 32 to col. 8, line 20, the received signal is applied to a stored function to derive HMM, wherein each state of the HMM is represented by probabilistic distribution*); and means for detecting the presence of speech using said obtained parameter values (*Speech Activity detector 52 in figure 5*).

4. Regarding claims 55-56, Haimi-Cohen discloses a speech recognition system and a speech processing system comprising: a receiver operable to receive an input signal representative of an audio signal (*input of element 51 in figure 5*); a memory operable to store a predetermined function which gives, for a given set of audio signal values, a probability density for parameters of a predetermined speech model which is assumed to have generated the set of audio signal values, the probability density defining, for a given set of model parameter values, the probability that the predetermined speech model has those parameter values, given that the speech model is assumed to have generated the set of audio signal values (*col. 7, line 32 to col. 8, line 20*); an applicator operable to apply a set of audio signal values representative of the input signal to said stored function to give the probability density for said model parameters for the set of audio signal values (*col. 7, line 32 to col. 8, line 20, the received signal is applied to a stored function to derive HMM, wherein each state of the HMM is represented by probabilistic distribution*); a processor operable to process said function with said set of received audio signal

values applied to obtain values of said parameters that are representative of said input audio signal (*col. 7, line 32 to col. 8, line 20, the received signal is applied to a stored function to derive HMM, wherein each state of the HMM is represented by probabilistic distribution*); a detector operable to detect the presence of speech using said obtained parameter values (*Speech activity detector 52 in figure 5*); and recognition processor operable to perform a recognition processing of the portion of the input signal corresponding to speech (*element 53 in figure 5*).

5. Regarding claims 7, 9, 27, 29, and 48, Haimi-Cohen further discloses an apparatus, wherein said receiving means is operable to receive a sequence of sets of signal values representative of an input audio signal and wherein said applying means, processing means and detecting means are operable to perform their function with respect to each set of received audio signal values in order to determine whether or not each set of received signal values corresponds to speech (*elements 51-53 in figure 5*), and wherein said sets of signal values in said sequence are non-overlapping (*samples input into features extractors 51*).

6. Regarding claims 18, 38, and 54, Haimi-Cohen further discloses an apparatus according to claim 1, further comprising means for evaluating said probability density function for the set of received audio signal values using one or more derived samples of parameter values for different numbers of parameter values (*col. 7, line 32 to col. 8, line 51, the received signal is applied to a stored function to derive HMM, wherein each state of the HMM is represented by probabilistic distribution*), to determine respective probabilities that the predetermined speech model has those parameter values and wherein said processing means is operable to process at

least some of said derived samples of parameter values and said evaluated probabilities to determine said values of said parameters that are representative of the audio speech signal (*col. 7, line 32 to col. 8, line 51, the received signal is compared with pre-stored speech models*).

7. Regarding claims 19-20 and 39-40, Haimi-Cohen further discloses a speech recognition system comprising: an apparatus according to claim 1 for detecting the presence of speech within the input signal (*Speech Activity Detector 52 in figure 5*); and recognition processing means for performing a recognition processing of the portion of the input signal corresponding to speech (*Speech Recognition Module 53 in figure 5*).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2-6, 22-26, and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimi-Cohen (US 6374221) in view of Rajan et al. (IEEE Publication).

10. Regarding claims 2-6, 22-26, and 44-47, Haimi-Cohen fails to specifically disclose a processing means comprising means for drawing samples from said probability density function and means for determining said values of said parameters that are representative of the speech

from said drawn samples, wherein said drawing means is operable to draw samples iteratively from said probability density function, wherein the processing means comprises a Gibbs sampler, and wherein said processing means is operable to determine a histogram of said drawn samples and wherein said values of said parameters are determined from said histogram, and wherein said processing means is operable to determine said values of said parameters using a weighted sum of said drawn samples, and wherein the weighting is determined from said histogram.

However, Rajan et al. teach a processing means comprising means for drawing samples from said probability density function and means for determining said values of said parameters that are representative of the speech from said drawn samples (*section 3 page 250*), wherein said drawing means is operable to draw samples iteratively from said probability density function (*section 3 page 250*), wherein the processing means comprises a Gibbs sampler (*section 3 page 250*), wherein said processing means is operable to determine a histogram of said drawn samples and wherein said values of said parameters are determined from said histogram (*section 6.1 page 252*), and wherein said processing means is operable to determine said values of said parameters using a weighted sum of said drawn samples, and wherein the weighting is determined from said histogram (*section 4.1 page 251*).

Since Haimi-Cohen and Rajan et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Haimi-Cohen by incorporating the teaching of Rajan et al. in order to enhance speech recognition accuracy.

11. Claims 8, 12-14, 16-17, 28, 32-34, 36-37, 49, and 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimi-Cohen (US 6374221) in view of Handel (6324502).

12. Regarding claims 8, 28, and 49, Haimi-Cohen fails to disclose an apparatus, wherein said processing means is operable to use the values of parameters obtained during the processing of a preceding set of signal values as initial estimates for the values of the corresponding parameters of a current set of signal values being processed. Handel et al. teach that the processing means is operable to use the values of parameters obtained during the processing of a preceding set of signal values as initial estimates for the values of the corresponding parameters of a current set of signal values being processed (*col. 6, lines 31-40*).

Since Haimi-Cohen and Handel et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Haimi-Cohen by incorporating the teaching of Handel et al. in order to reduce processing time to enhance system's effectiveness.

13. Regarding claims 12, 32, and 51, Haimi-Cohen disclose an apparatus, wherein said detecting means is operable to compare the number of parameters used to represent speech within the audio signal values with a predetermined threshold value, in order to detect the presence of speech within said audio signal (*speech recognition module 53 in figure 5*). Haimi-Cohen fail to specifically disclose a processing means operable to vary the number of parameters used to represent the speech within the audio signal values. However, Handel et al. teach a

processing means operable to vary the number of parameters used to represent the speech within the audio signal values (*output of elements 20 or 26 in figure 1*).

Since Haimi-Cohen and Handel et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Haimi-Cohen by incorporating the teaching of Handel et al. in order to reduce processing power to enhance system's effectiveness.

14. Regarding claims 13, 33, and 52, Haimi-Cohen disclose an apparatus, wherein received speech signal values are representative of a speech signal generated by a speech source as distorted by a transmission channel between the speech source and the receiving means (*signal at input of element 51 in figure 5*); and a detecting means is operable to detect the presence of speech within said input audio signal from the obtained values of said first parameters (*speech recognition module 53 in figure 5*).

Haimi-Cohen fails to disclose that the predetermined function includes a first part having first parameters which models said source and a second part having second parameters which models said channel; wherein said processing means is operable to obtain parameter values of at least said first parameters. However, Handel et al. further teach that the predetermined function includes a first part having first parameters which models said source and a second part having second parameters which models said channel (*elements 18 and 22 in figure 1*); wherein said processing means is operable to obtain parameter values of at least said first parameters (*output of element 18 in fig. 1*).

Since Haimi-Cohen and Handel et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Haimi-Cohen by incorporating the teaching of Handel et al. in order to suppress the noise to enhance signal quality for subsequent processing.

15. Regarding claims 14, 34, and 53, Haimi-Cohen fails to disclose an apparatus according to claim 13, wherein said function is in terms of a set of raw speech signal values representative of speech generated by said source before being distorted by said transmission channel, wherein the apparatus further comprises second processing means for processing the received set of signal values with initial estimates of said first and second parameters, to generate an estimate of the raw speech signal values corresponding to the received set of audio signal values and wherein said applying means is operable to apply said estimated set of raw speech signal values to said function in addition to said set of received signal values.

However, Handel et al. further teach that said function is in terms of a set of raw speech signal values representative of speech generated by said source before being distorted by said transmission channel (*input of element 18 in figure 1, microphone 10 introduces distortion*), wherein the apparatus further comprises second processing means for processing the received set of signal values with initial estimates of said first and second parameters, to generate an estimate of the raw speech signal values corresponding to the received set of audio signal values and wherein said applying means is operable to apply said estimated set of raw speech signal values to said function in addition to said set of received signal values (*the operation of figure 1 and also referring to col. 8, lines 1-25*).

Since Haimi-Cohen and Handel et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Haimi-Cohen by incorporating the teaching of Handel et al. in order to suppress the noise to enhance signal quality for subsequent processing.

16. Regarding claims 16-17 and 36-37, Haimi-Cohen fails to disclose an apparatus, wherein said second processing means comprises a Kalman filter, and wherein said second part is a moving average model and wherein said second parameters comprise moving average model coefficients. However, Handel et al. teach the said second processing means comprising a Kalman filter (*Kalman Filter 34 in figure 1*), and wherein said second part is a moving average model and wherein said second parameters comprise moving average model coefficients (*col. 6, lines 1-15*).

Since Haimi-Cohen and Handel et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Haimi-Cohen by incorporating the teaching of Handel et al. in order to remove noise to enhance signal quality for subsequent processing.

17. Claims 15 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimi-Cohen (US 6374221) in view of Handel (6324502), and further in view of Rajan et al. (IEEE Publication).

18. Regarding claims 15 and 35, the modified Haimi-Cohen fails to specifically disclose an apparatus, wherein said second processing means comprises a simulation smoother. However, Rajan et al. further teach that second processing means comprises a simulation smoother (*section 4.2 page 251*).

Since the modified Haimi-Cohen and Rajan et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Haimi-Cohen by incorporating the teaching of Rajan et al. in order to ensure that high frequency basis vectors do not have an excessive effect on each of the AR coefficient representations.

19. Claims 10-11, 30-31, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimi-Cohen (US 6374221) in view of Bartkowiak et al. (US 5507037).

20. Regarding claims 10-11, 30-31, and 50, Haimi-Cohen fails to specifically disclose that the speech model comprises an auto-regressive process model, wherein said parameters include auto-regressive model coefficients and wherein said detecting means is operable to compare the value of at least one of said auto-regressive model coefficients with a pre-stored threshold value. Haimi-Cohen fails to specifically disclose that the speech model comprises an auto-regressive process model, wherein said parameters include auto-regressive model coefficients. However, Bartkowiak et al. teach that the speech model comprises an auto-regressive process model, wherein said parameters include auto-regressive model coefficients and wherein said detecting

means is operable to compare the value of at least one of said auto-regressive model coefficients with a pre-stored threshold value (*col. 5, lines 30-43*).

Since Haimi-Cohen and Bartkowiak et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Haimi-Cohen by incorporating the teaching of Bartkowiak et al. in order determine if the input signal is speech or noise so that appropriate action can be taken in subsequent processing to enhance signal quality.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen Vo whose telephone number is 703-305-8665. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner Huyen X. Vo January 12, 2005

/SUSAN MCFADDEN/
SUSAN MCFADDEN
PRIMARY EXAMINER